

Lateral Knee Osteoarthritis

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Abstract

Background: gonarthrosis is a common entity characterized by involvement of one or more compartments, of which the lateral one is the one with the lowest incidence in isolation.

Aim: the aims of this research are too updated on the most important features on lateral knee osteoarthritis and look for updated bibliography on the subject.

Methods: PubMed, Hinari, SciELO and Medline databases were searched for citations from August 1st 2021 to September 30th 2021 using the EndNote search manager and reference manager. Out of 312 articles, 44 selected citations were used in this review, being 42 of the last five years.

Results: the main causes of lateral knee osteoarthritis are mentioned, especially the secondary ones. Reference is made to the main clinical and imaging elements for diagnosis based on plain radiography and magnetic resonance imaging. Both conservative and surgical treatment modalities are exposed, in the latter the main indications and complications are described, among which osteotomies and arthroplasties stand out.

Conclusions: lateral gonarthrosis is the least common of the unicompartmental gonarthrosis that affect the knee joint. Clinical and imaging diagnosis provides the essential elements for both conservative and surgical therapeutic behaviour, the latter modality includes techniques that preserve the joint such as osteotomies and others that do not, such as arthroplasties.

Key words: lateral knee osteoarthritis; valgus angular deviation; arthroscopy; osteotomy; partial and total knee replacement

1. Introduction

Osteoarthritis is the most common degenerative and progressive joint disease. It affects millions of people and involves joints such as the hips, spine and knees with a high economic cost.

The knee is one of the most affected joints by this degenerative entity, the main symptoms and signs are mechanical pain with swelling and limitation of joint movement to different degrees, accompanied by crepitus and locking. [1, 2]

A simple X-ray is the most used test to confirm the diagnosis; it stands out due to its low cost and high availability. Radiographs may show the classic signs of joint space narrowing, sclerosis, subchondral cysts, osteophytes and subluxation. [3, 4]

The knee joint is made up of three compartments, the medial and lateral tibiofemoral, in addition to the patellofemoral; all of them are not affected symmetrically. Unicompartmental knee osteoarthritis, mostly affects the medial tibiofemoral compartment, then the patellofemoral and finally the lateral one with the lowest incidence of all. Valgus deviation is defined as one that exceeds 7 to 10 degrees. [5, 6, 7]

Treatment of patients with lateral gonarthrosis ranges from conservative to surgical modalities, the latter differentiated between those that preserve the joint and others that do not, such as partial or total arthroplasties, each modality with very specific indications. [8, 9, 10]

The aims of this investigation are too updated on the most important features of lateral knee osteoarthritis and look for updated bibliography on the subject.

2. Methods

An extensive literature search in various data bases such as: PubMed [https://pubmed.ncbi.nlm.nih.gov/], Hinari [https://www.who.int/hinari/es/], SciELO [https://scielo.org/es/] and Medline [https://medlineplus.gov] was carried out with search term including 'lateral knee osteoarthritis', 'valgus knee osteoarthritis', and 'valgus knee deformity' from August 1st 2021 to September 30th 2021. Out of 312 articles, 44 selected citations were used in this review, being 42 of the last five years.

Our inclusion criteria included all the investigations in patients with lateral knee osteoarthritis. Articles related to complications derived from arthroplasty and those carried out in immature skeletons were excluded.

3. Etiology

Lateral knee osteoarthritis may be primary or secondary, within the latter, the post-traumatic gonarthrosis is due to previous fractures of the tibial plateau and postoperative procedures such as meniscectomies. Lateral tibial plateau is more convex than medial that is why meniscectomy increases significantly the contact between the joint surfaces and favors the development of degenerative changes in the joint. [11, 12]



Figure 1. Patients with lateral knee osteoarthritis and valgus deformity.

On palpation, joint line pain or well-localized pain, crepitus, effusion, locking and catching can be detected. Stability maneuvers show laxity of the medial ligaments and shortening of the lateral ones, these are essential elements to be taken into account for treatment. [14, 15]

Radiography is of great help for the diagnosis, but it is important to remember that osteoarthritis is an entity in which the clinical and imaging features are not linear and symmetrical, hence there may be patients with marked degenerative changes on radiographs and have few symptoms or vice versa. On plain radiographs Fujisawa point should be calculated to determinate osteotomy and evaluate limb alignment after surgical procedures. [16, 17, 18]

Although the most widely used imaging tests are plain radiographies in posteroanterior and lateral weight-bearing projections with 30 degrees of knee flexion (Rosenberg view), magnetic resonance imaging also provides highly helpful features, especially those related to the condition status of the menisci, thickness and contour of the articular cartilage in addition to the state of the rest of the compartments within the joint. [20, 21]

Computerized axial tomography has very specific indications in patients with lateral knee osteoarthritis and its use is reserved for evaluating bone anatomy in surgical planning. [22, 23]

Treatment methods for patients with lateral knee osteoarthritis are similar to those of the rest of the compartments; however patients tolerate nonoperative treatment better than those with medial compartment involvement. [24, 25]

4. Pertinent physical examination and imaging

Patients with lateral knee osteoarthritis usually seek medical assistance complaining of moderate to severe pain and valgus deformity; both have been increased in recent months accompanied by gait claudication. On physical examination, the valgus deformity is detected by inspection; a simple and effective method of detecting angulation is by measuring the Q angle, from the anterior superior iliac spine to the center of the patella and from there to the anterior tibial tuberosity (Figure 1). [13, 14]

5. Treatment

5.1. Nonoperative treatment

Nonoperative treatment is the most used modality and includes non-steroidal anti-inflammatory analgesics, viscosupplementation, and intra-articular steroids. Others non-pharmacological treatment options such as braces or orthoses, modifications of footwear and physical activity, body weight lost, use of crutches or canes and physical therapy and rehabilitation also may be helpful. Pain relief from the use of orthoses suggests a good future response to corrective osteotomies and unicompartmental arthroplasties. [26, 27]

5.2. Surgical treatment

Surgical procedures for patients with lateral knee osteoarthritis and valgus deformity are osteotomies, and unicompartmental or total arthroplasty. The first modality respects the patient's joint and manages to correct the deformity. [28, 29]

Corrective osteotomies in patients with lateral knee osteoarthritis aim to reduce the weight load in the affected compartment. General indications for osteotomy include age (younger than 65 years), patients with degrees I and II of Ahlback classification of lateral compartment, slight laxity of the ligaments, and a good range of motion of at least 90 degrees of knee flexion. [30, 31]

Contraindications for femoral osteotomies are: the presence of osteoarthritis of the medial or tricompartmental compartment, symptoms

related to the medial compartment of the joint due to inflammatory arthritis, flexion contracture greater than 15 degrees, knee flexion less than 90 degrees and severe osteoporosis. [32, 33]

Distal femoral osteotomies may be medial closed and lateral open, both with the purpose of aligning the limb and achieving a horizontal joint line placement. The differences between these two procedures can be seen in Table 1. [28, 31]

Factor	Medial	Lateral
Technical difficulty	Greater	Less
Need for graft	No	Yes
Delayed union	Less	Greater
Cut over the bone	Complete (both corticals)	Partial (one cortical)

Table 1: Differences between femoral osteotomies for patients with lateral knee osteoarthritis and valgus deformity.

Arthroscopy can be performed in conjunction with osteotomy and is justified in patients with the presence of symptoms and mechanical joint signs due to involvement of the menisci and the possibility of loose bodies. Arthroscopy allows the performance of meniscectomies,

synovectomy, and removal of loose bodies and grading of the cartilage condition in each of the compartments. [2, 34]

Advantages and disadvantages of arthroscopy and osteotomy at the same time are summarized in the table 2. [35, 36]

Advantages	Disadvantages
Two surgical procedures (arthroscopy and osteotomy) are performed at the same time.	Longer surgical time.
Weight bearing is not allowed after osteotomy and in case of microfracture by arthroscopy, at one time.	A long learning curve is needed.
It allows a real time evaluation of the articular surface.	
The combined technique reduces time to start rehabilitation.	

Table 2: Advantages and disadvantages of arthroscopy and osteotomy at the same time.

Complications related to of osteotomy in patients with lateral knee osteoarthritis are few, the most common complication is joint stiffness, and its incidence is reduced by avoiding the joint during surgery. Nonunion is the second most common complication with an incidence of 4.2 to 19% and is associated with failure of the osteosynthesis material, especially when it is placed on the medial side. [32, 33]

The results of medial and lateral partial arthroplasty are similar. Partial arthroplasty is contraindicated in patients with involvement of other compartments of the knee, presence of instability, inflammatory arthritis, and fixed valgus deformity. In these situations, total joint arthroplasty is more advisable. [39, 40]

Lateral unicompartmental arthroplasty represents from 10 to 23% of all partial arthroplasties, it is a surgical treatment modality that preserves part of the joint; the main indications for this treatment are isolated involvement of the lateral compartment with a 90-degree joint range of motion. The advantages of this technique lie in the low loss of blood during the operation and a low rate of complications. [37, 38]

Lateral knee osteoarthritis usually appears later in life, hence total knee replacement is a very good option in these patients. The main indication for total knee arthroplasty is tricompartmental joint disease associated with limited response to pain despite nonoperative treatment and other surgical treatment modalities. [41, 42]

Krackow KA classification cited by Greenberg A et al. is useful during the performance of total knee arthroplasty in patients with valgus deformity and is divided into three grades (Table 3).

Types	Characteristics
I	Involves lateral femoral bone loss, lateral soft tissue contractures, and intact medial soft tissues.
II	Adds lengthened medial soft tissues.
III	Is a severe valgus deformity with malpositioning of the proximal tibial joint line?

Table 3: Krackow KA classification cited by Greenberg a et al., [43] for patients with valgus deformity during the placement of total knee arthroplasty.

Valgus contracture causes contracture of the lateral structures, hence the need for extensive releases to achieve alignment and balance of the ligaments, and for this reason patellofemoral instability and peroneal nerve injuries can occur. [42, 43]

such as osteotomies associated to arthroscopy and others that do not, among which arthroplasties stand out.

At present, robotic and navigational surgery significantly improve the short-term and long-term results of all the surgical modalities described above. [44]

Declaration of competing interest

6. Conclusions

Lateral knee osteoarthritis is the least common of the unicompartmental osteoarthritis that affect the knee joint. The clinical and imaging diagnosis provides the essential features for both nonoperative and surgical modalities, the latter modality includes techniques that preserve the joint

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